Anchor Environmental, L.L.C.
23 S. Wenatchee Avenue, Suite 120
Wenatchee, WA 98801
Phone: (509) 888-2070
Fax: (509) 888-2211

Memorandum

To: Eric Blischke, USEPA Region 10
Chip Humphrey, USEPA Region 10

From: Carl Stivers, Anchor Environmental

CC: LWG Managers (Bob Wyatt, Jim McKenna, and Rick Applegate)

Date: December 17, 2007

Re: Preliminary Proposal for Feasibility Study (FS) Mobility Testing

In an email dated October 17, 2007 from Eric Blischke regarding "Leachate Testing to Support Portland Harbor FS", EPA requests further discussion of potential leachate or mobility testing and a proposal from the LWG for such testing. This memo presents a preliminary description of such a proposal for mobility testing.

EPA's email provides their reasoning for considering the following mobility tests at 15 Site locations and 2 "reference" areas:

- Dredging Elutriate Test (DRET)
- Modified Elutriate Test (MET)
- Sequential Batch Leachate Test (SBLT)
- Pancake Column Leachate Test (PCLT)
- Toxicity Characteristic Leaching Procedure (TCLP) described in hazardous waste regulations
- Bulk sediment analyses for Portland Harbor Chemicals of Concern (COC) and any other parameters of interest (e.g., grain size and TOC) in support of these tests.

All of these tests are described in the Corps Upland Testing Manual (USACE 2003) except TCLP, which is described in federal regulations (40 CFR §261.24).

Rationale for Selection of Mobility Tests for the FS

We have reviewed EPA's stated rationale and purpose for each test in the email. One logistical complication with conducting these tests at this time is that they are designed to be conducted on the material that is proposed for dredging and disposal. At this time in the RI/FS process we

do not know the exact areas and volumes to be potentially removed or the range of locations and conditions where those materials might be disposed (although we do have one example in the proposed T-4 facility). However, we have reviewed the mobility tests that EPA is considering in an effort to identify those tests that we think would provide the most value at the FS stage of the project as well as those tests that are expected to have relatively little value because 1) identification of dredge material and disposal options is too preliminary at this time and/or 2) other useful methods exist to evaluate issues related to these tests at an FS-appropriate level of detail.

DRET

The DRET test is a bench-scale elutriate test that is intended to estimate the chemical concentrations in the water column near the point of dredging. Often this test is used as a screen against water quality criteria to determine if any exceedances of such criteria are likely, even very close to the point of dredging. These results can also be used in some models to estimate the mixing zone distances needed to meet criteria if they are expected to be exceeded near the point of dredging.

The DRET test is not recommended for the FS. The Army Corps has developed the DREDGE model, which mimics potential water quality impacts based on bulk sediment chemistry and other basic information about the sediments and water column (Hayes and Chung-Hwan 2000). The model is set up for input of bulk sediment chemical concentrations as inputs parameters not DRET results. Since the model was originally developed, techniques to apply DRET results to this model have been developed, but they are not a pre-requisite for using this model. We would propose that bulk sediment chemistry can be used in conjunction with the DREDGE model or similar models for the evaluation of this issue at an FS-appropriate level of detail.

MET

The MET (more recently known as the Effluent Elutriate Test or EET) is intended to estimate potential chemical concentrations in confined disposal facility or temporary dewatering facility effluents discharged during construction. The MET, along with several potential models available from the Army Corps, can be used to assess the sizing and filling requirements for such facilities.

The MET test will have some influence on the size, and therefore, cost of some confined disposal and dewatering options. Without MET data, bulk sediment chemistry, literature partitioning coefficients, and conservative assumptions about TSS levels in effluents (based on grain size information) can be used to approximately estimate the chemical concentrations in disposal facility effluents under different sized facilities per the Upland Testing Manual guidance. However, select MET testing would provide a means to refine these estimates and reduce the range of estimated disposal facility sizes and other basic features that may affect the cost criterion of the FS evaluation.

SBLT and PCLT

The SBLT and PCLT tests are intended as methods to estimate groundwater leachate concentrations and characteristics from confined disposal facilities. Per the Upland Testing Manual, "Since the SBLT test is a simpler procedure and is more cost and time effective than the PCLT, the SBLT test would normally be preferred for freshwater sediments." The only exception to this in the manual is for NAPL containing sediments, in which case the manual indicates the PCLT may be a better test. Also, over the history of the PCLT it has been modified in a number of respects for actual application to various projects. This generally includes using disposal site groundwater (or artificial water intended to mimic disposal site specific conditions) and setting a flow rate through the PCLT column based on the expected subsurface conditions at the disposal site. Given that the range of disposal site conditions potentially applicable for this project is unknown at this time, this would make the more advanced, and generally more accurate, application of the PCLT test impossible. Also, the cost of the PCLT is an order of magnitude higher than the SBLT, and it is not unusual for the PCLT to take 3 to 6 months to complete. For all these reasons, of the two tests, the SBLT is clearly the more applicable and feasible for consideration in the FS.

The SBLT is also in many respects a more generalized test that relies less closely on disposal site specific conditions and can establish a general desorption isotherm that is potentially applicable or useful in a wide range of situations, including a variety of confined disposal options as well as in-situ capping of sediments. Given that volumes and areas of remediation have not been determined yet, a broad screening of site sediments to understand the variation of potential leachate characteristics would be much more cost effective using the SBLT both in terms of cost to conduct the test and the wider usefulness of the results. One caution per the guidance is that

sediments with high levels of product such as NAPL may result in potentially inapplicable results using the SBLT. Thus, SBLT results from any such samples would need to be evaluated carefully. However, given the screening nature of these tests and that most Portland Harbor sites probably do not fall into this category, this is appears to be a reasonable level of uncertainty for use of the leachate results.

Consequently, it appears reasonable that conducting select SBLT tests may provide additional site specific information to refine evaluations of both disposal facilities and in-situ caps for the project. Particularly for in-situ capping evaluations, Transition Zone Water data available at some locations within Portland Harbor should also be used to estimate the effectiveness of caps.

TCLP

The TCLP is a standardized simple leaching procedure that is promulgated in federal regulation to determine whether a material is a "hazardous waste". Hazardous wastes generally have to be disposed of in Subtitle C landfills, which have more robust groundwater leachate controls resulting in higher disposal costs. An EPA promulgated screening calculation can be used to assess the need for TCLP testing. The calculation assumes that the entire bulk sediment concentration would leach into the test water during the TCLP test. If the calculated water concentrations are below the TCLP criteria, exceedance during an actual TCLP test is impossible.

Table 1 contains a preliminary screening calculation using the maximum sediment chemical concentrations from the Site. Site sediments exceed the TCLP screen at several locations shown in Table 1. Given that there is the potential for some Site sediments to exceed TCLP test criteria, it appears that select TCLP testing should be conducted to determine if any Site sediments may need to be handled as hazardous waste.

Preliminary LWG Proposal for Mobility Testing

Per the rationale above, there appears to be some value for the FS in conducting select MET, SBLT, and TCLP sampling.

MET and SBLT Testing

For the MET and SBLT tests, sampling should take place in likely removal areas. The potential removal areas will be defined in the FS and are not known at this time. However, it is reasonable to assume that areas with higher chemical concentrations will be more likely to have removal as at least an evaluated option in the FS. Table 2 summarizes the site-wide 95th percentile chemical concentrations for the Round 2 Report iCOCs and identifies those iAOPCs where concentrations above those levels occur. Table 3 further summarizes the iAOPCs that exceed these 95th percentile chemical levels and for which chemicals. The result in Table 3 is a selection of 11 areas where MET and SBLT samples would be collected. We believe this is a good method for identifying areas for mobility testing that is based on known sediment chemistry versus EPA's email which identifies 15 areas on an unexplained basis. Table 3 also compares the locations of the LWG proposal to the locations discussed in EPA's email. Note that these locations are preliminary and may be further refined during development of the actual Field Sampling Plan (FSP) for this work.

The sampling methods for MET and SBLT tests would be to collect approximately four vibracores from each of these 11 areas. The four cores at each location would range across the currently identified area of potential concern as identified on both LWG and EPA maps. These four cores would then be composited into one sample for submittal to the laboratory, for a total of 11 samples. The exact locations for each of these cores and compositing scheme has not yet been determined, but would be identified the FSP for this work. Methods for testing the samples would follow the Upland Testing Manual, with details provided in the FSP.

Note that EPA also discusses the concept of conducting mobility tests for relatively clean sediments to provide a "reference" for other results. We are unaware of any purpose of mobility testing in clean sediments or any guidance suggesting that such an approach is warranted or useful in test result evaluations. Consequently, we would not recommend collecting or testing any "reference" sediments.

TCLP Testing

Per the above screening analysis, we recommend TCLP testing at the 10 locations shown in Table 1. These locations were chosen based on samples that were greater than five times the TCLP screening level. Again, these locations are preliminary and may be refined in the actual

FSP. Because there will likely be some ability to segregate materials into hazardous and non-hazardous dredge management units within individual areas of concern, we suggest that the TCLP cores focus on zones of higher chemical levels within each general area identified in Table 1. It is important to note that this is a somewhat conservative approach and that if any locations exceed actual TCLP test criteria, further work will be needed in the design phase to delineate areas of hazardous vs. non-hazardous waste within these areas of concern.

References

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